

REMARKS

Applicants respectfully request reconsideration in view of the reasons that follow.

New claim 12 has been added.

Claim 3 has been cancelled.

Claims 1, 2, and 4-12 are pending in this application.

This amendment adds, changes and/or deletes claims in this application. A detailed listing of all claims that are, or were, in the application, irrespective of whether the claim(s) remain under examination in the application, is presented, with an appropriate defined status identifier.

Rejection under 35 U.S.C. § 102

Claims 1, 4-9, and 11 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,991,663 (hereafter “Abe”). This rejection is respectfully traversed.

Amended claim 1 recites a fuel vaporizing device that includes a fuel vaporizer, “a fuel injector which supplies fuel into the fuel vaporizer during normal running and start-up of the fuel reformer,” “an air injector which supplies air into the fuel vaporizer to produce an air-fuel mixture in the fuel vaporizer during the normal running and the start-up of the fuel reformer,” “a glow plug which is disposed downstream of the fuel injector and the air injector in the fuel vaporizer and partially oxidizes the air-fuel mixture produced inside the fuel vaporizer,” and a water injector.

Abe discloses a gas supply for a fuel cell that includes a reformer 1, a start-up combustor 4, and a vaporizer 17. See Abe at col. 3, lines 12-21. Abe discloses that the start-up combustor 4 is used to supply hot combustion gas when the power plant is starting up and that the start-up combustor 4 stops operating when the power plant is running in steady state. See Abe at col. 3, lines 19-21, and col. 5, lines 17-20. Abe also discloses that the vaporizer 17 supplies vaporized fuel and steam to the reformer 1 during the steady state, while valves 21, 22 are closed during start up. See Abe at col. 4, lines 35-38, and col. 5, lines 17-20. Therefore, Abe fails to disclose a fuel vaporizing device with “a fuel injector which supplies fuel into the fuel vaporizer during normal running and start-up of the fuel reformer” because the start-up combustor 4 only operates during start-up operation and valve 21 of the vaporizer

17 only functions during steady state operation. Nor does Abe disclose “an air injector which supplies air into the fuel vaporizer to produce an air-fuel mixture in the fuel vaporizer during the normal running and the start-up of the fuel reformer,” for at least the same reasons.

The vaporizer 17 of Abe includes a valve 22 that provides water from a water pump 24. See Abe at col. 4, lines 32-35. However, the vaporizer 17 of Abe does not include a glow plug. The start up combustor 4 of Abe includes a fuel injector 27A, an air injector 27B, and a glow plug 9. However, the start combustor 4 of Abe does not include a water injector.

For at least these reasons, Abe does not disclose all of the features recited by claim 1. Withdrawal of this rejection is respectfully traversed.

Rejections under 35 U.S.C. § 103

Claims 2 and 10 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Abe. This rejection is respectfully traversed. The Office states that it would have been obvious design choice to modify the system of Abe to use the excess air factors of claims 2 and 10. However, it would not have been obvious design choice to modify the system of Abe to provide the features of claim 1 that Abe does not disclose or suggest. Nor would one of ordinary skill in the art have had motivation to make such a modification of Abe. Withdrawal of this rejection is respectfully requested.

Applicants’ embodiment causes a fuel-air mixture to be partially oxidized by a glow plug so that the partial oxidation generates heat that causes fuel in the unoxidized fuel-air mixture to be vaporized. This prevents excessive partial oxidation while providing an adequate amount of vaporized fuel to a reformer, thus allowing the reformer to efficiently generate reformate gas through steam reforming. Furthermore, by controlling an excess air factor, Applicants’ embodiment suppresses an excessive rise in the reforming reaction temperature due to insufficient excess air and resultant NO_x, while ensuring a required combustion gas temperature to warm up the reformer.

Claim 3 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Abe. This rejection is respectfully traversed. Claim 3 depends upon claim 1 and is allowable over Abe for at least the reasons noted above. Furthermore, it would not have been obvious to one of ordinary skill in the art to modify the start up combustor 4 of Abe to add a water injector

because Abe discloses that the temperature of the combustion gas in the start up combustor 4 is detected by a temperature sensor 23 so that the temperature can be controlled by adjusting the supply of fuel and air to the start up combustor 4. See Abe at col. 5, lines 61-65. Therefore, it would not have been obvious to modify the start up combustor 4 of Abe to include a water injector. Nor would one have had motivation to make such a modification because Abe already discloses a means for regulating combustion gas temperature. Withdrawal of this rejection is respectfully requested.

Applicants believe that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

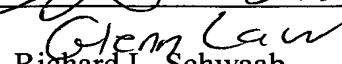
The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check or credit card payment form being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

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